Neutron-activated Sm-153-ion-exchange resin as a tracer for gastrointestinal scintigraphy

Type: Article

Abstract:

Nuclear medicine techniques are well established for the investigation of gastrointestinal (GI) motility and transit. Ion-exchange resins radiolabelled with Tc-99m and In-111 are widely used as nonabsorbable radiopharmaceutical markers, with In-111 being preferred for whole-gut transit studies. This radionuclide, however, is not produced in many countries and may be expensive when obtained through international shipment. This study describes the use of neutron-activated Sm-153-resin as an alternative tracer for use in GI scintigraphic investigation. A measure of 50 mg of stable samarium-152 chloride ((SmCl3)-Sm-152) was incorporated into 100 mg of cation-exchange resin and irradiated in a neutron flux of 1 x 10(13) cm(-2) s(-1) for 100 s to achieve an activity of 5 MBq after 66 h. Aliquots of In-111-radiolabelled resin (5 MBq) were prepared for comparison of labelling and stability. Radiolabelling efficiencies were obtained by washing resin with distilled water, and the activity lost was measured. The radiolabelled resins were immersed in simulated gastric and intestinal fluid environments, and the retention of Sm-153(3+) and In-111(3+) was measured over a 24 h period. At 66 h after production, 91.15 +/- 12.42% of Sm-153 was bound to the resin after washing in distilled water, whereas radiolabelling with In-111 achieved 99.96 +/- 0.02% efficiency. Both radiolabelled resins demonstrated almost 100% stability in simulated intestinal fluid and > 90% stability in artificial gastric juice over 24 h. The performance of neutron-activated Sm-153-resin is similar to that of In-111-resin and can be used as an alternative tracer for GI transit studies when In-111 is not available.

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